

**IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS**

SINGULAR COMPUTING LLC,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

C.A. No. 1:19-cv-12551-FDS

Hon. F. Dennis Saylor IV

**DEFENDANT GOOGLE LLC'S REPLY BRIEF IN SUPPORT OF ITS MOTION FOR  
FURTHER CLAIM CONSTRUCTION UNDER *O2 MICRO***

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## I. INTRODUCTION

Singular’s opposition brief only confirms the existence of a genuine claim-construction dispute that pervades the parties’ recent briefing (*see* Memo. 1) and that the Court has a “duty” to resolve before trial. *See O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008). Singular does not attempt to characterize the dispute as one of fact, nor does it offer persuasive reasons for holding that Google waived its claim construction position. Claim-construction waiver is an extremely narrow doctrine that is not applicable here—especially given the fact that Singular has taken inconsistent positions regarding the meaning of the claimed “execution units.”

On the merits, Singular largely fails to engage with the points Google raised in its opening memorandum. The word “unit”—as used in the claimed “execution units” and throughout the remainder of the intrinsic record—refers to a distinct, complete entity. Ignoring the clear intrinsic evidence, Singular points primarily to *extrinsic* evidence (which actually *supports* this ordinary understanding of the word “unit” and the phrase “execution unit”). And Singular’s responses to the other intrinsic evidence fare no better. The only “principled” basis Singular offers for counting overlapping execution units conflicts with its prior positions, this Court’s construction, and binding precedent. Moreover, to oppose Google’s arguments, Singular is forced to ignore clear precedent on the interpretation of “connected to” and Dr. Bates’s own statements about how his claimed “invention” is directed to parallel hardware.

Thus, the Court should clarify its prior construction to explain that a claimed “execution unit” cannot overlap with any other execution unit, construing that term to mean a “*physically distinct* processing element comprising an arithmetic circuit paired with a memory circuit.” (emphasis on language added to prior construction, *see* Dkt. 354 at 25).

## II. ARGUMENT

### A. Singular's Waiver Argument Lacks Any Support in Law or Fact

Google has not waived its right to seek further construction of the claimed “execution unit.” Courts have discretion to hold that a claim-construction argument has been waived in certain narrow instances, but there is no basis for finding a waiver here.

Waiver of a claim-construction position occurs only in “a narrow set of circumstances.” *Daedalus Blue, LLC v. MicroStrategy Inc.*, No. 2:20-cv-551, 2023 WL 5941736, at \*13 (E.D. Va. Sept. 12, 2023). “[A] thorough review of Federal Circuit precedent indicates that waiver” arises when “(1) a party fails to object to jury instructions using a certain claim construction, (2) engages in clear conduct showing acquiescence to a particular claim construction (e.g., withdrawing prior objections before later attempting to re-assert them), or (3) fails to preserve the issue at the district court level altogether.” *Id.* (collecting cases). Otherwise, “claim construction continues until a final judgment is rendered.” *Id.*

The primary case on which Singular relies provides an apt illustration of the narrowness of the waiver doctrine. *See Abiomed, Inc. v. Maquet Cardiovasc. LLC*, 566 F. Supp. 3d 59 (D. Mass. 2021). In that case, Abiomed had *proposed* a construction that this Court adopted. *Abiomed, Inc. v. Maquet Cardiovascular LLC*, 329 F. Supp. 3d 1, 36-38 (D. Mass. 2018) (construing a “guide mechanism” limitation, in accordance with Abiomed’s proposal, to cover a side-rigger structure); *see Abiomed*, 566 F. Supp. at 66-67 (summarizing *Markman* order). Yet at summary judgment, Abiomed tried to rewrite the meaning of its own proposed construction based on arguments that were unquestionably available during the initial claim-construction proceedings. *Abiomed*, 566 F. Supp. 3d at 74 (noting that Abiomed had presented disclaimer arguments on other terms, while declining to do so for the scope of *its* proposed side-rigger structure). Backtracking of that sort certainly justifies waiver.

Here, by contrast, the undisputed facts show that Google has been diligent and consistent in advancing its construction positions. *See* Memo. 1, 5. During the initial proceedings, Google argued that the claimed “execution unit” encompassed software and hardware, but the Court rejected that argument. *See* Dkt. 354 at 19-20. Then, as Singular’s infringement theory shifted, Dr. Khatri offered an infringement opinion built upon an unexpected and previously undisclosed interpretation of LPHDR “processing elements.” *Compare* Dkt. 410-4, *with* Dkt. 505 at 3. He claimed the processing elements can overlap. *E.g.*, Dkt. 505 at 6-7. Ever since, Google has explained how that opinion is inconsistent with the language of the claims. *See* Memo. 5 (recounting arguments). Singular contests *none* of these points, reciting only a laundry list of deadlines that have no bearing on Google’s diligent efforts (*see* Opp. 2-3) and failing to acknowledge the repeated times Google has challenged Dr. Khatri’s opinions as inconsistent with the claim language (*see* Opp. 2-5).

By contrast, Singular has treated the claim language like “a nose of wax” to be manipulated to serve its short-term goals. *Cf. Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1578 (Fed. Cir. 1995) (holding a patentee cannot offer claim interpretations that are inconsistent with the clear intrinsic record). As just one example, consider Singular’s conflicting arguments, at summary judgment and now, about how to count execution units:

- “Google falsely alleges that Dr. Khatri counts *operations* per cycle ‘in lieu of’ physical LPHDR execution units.” Dkt. 505 at 10 (emphasis added).
- The claimed execution units are adapted to execute a “reduced-precision *operation*,” so one can simply “count the number of reduced *outputs*” to assess infringement. Opp. 10 (emphasis altered).

Singular offers no explanation for that pivot, let alone an explanation that would justify its gamesmanship. Nor has Singular explained why it asked the Court to construe “processing

element” during prior briefing, Dkt. 500 at 6, yet now argues that any new claim construction argument is untimely. *See* Opp. 2-5.

Indeed, this is the exact situation in which further construction under *O2 Micro* is critical. There is a real dispute about the meaning of the claim language; Singular has taken advantage of remaining ambiguity about the scope of the claims to continually adjust its infringement theories; and resolving the parties’ dispute is therefore necessary to properly adjudicate infringement. Moreover, an express construction is important to prevent Singular from advancing arguments based on an incorrect construction before the jury. Thus, the Court has a “duty” to resolve the parties’ dispute. *O2 Micro*, 521 F.3d at 1362.

#### **B. Overlapping Processing Elements Are Inconsistent with the Intrinsic Record**

Ample evidence in the intrinsic record establishes one execution unit—i.e., a processing element—cannot overlap with another. Singular opposes this point by relying on *extrinsic* evidence and by ignoring the arguments Google made in its opening memorandum about the intrinsic record. *See* Opp. 5-12. As a result, Google’s arguments stand essentially un rebutted.

(1) As Google explained before, a “unit” is an individual thing that is regarded as single and complete (i.e., self-contained and distinct). An “apartment unit” does not overlap with other apartment units, and the phrase “ten washer/dryer units” would not cover ten washers that share one dryer. Memo. 7-11. Singular does not mention, let alone engage with, these clear examples.

Instead, Singular relies primarily on extrinsic evidence as support for its understanding of the word “unit.” Opp. 6. But extrinsic evidence is irrelevant when the intrinsic record is clear, as it is here (*see infra*, pp. 5-8). *E.g.*, *Seabed Geosolutions (US) Inc. v. Magseis FF LLC*, 8 F.4th 1285, 1287 (Fed. Cir. 2021). And in all events, the weight of Singular’s extrinsic evidence actually supports Google’s position. *See infra*, pp. 8-10.



As its primary *intrinsic* evidence, Singular points to the disclosure of “shared circuitry” in the written description of the asserted patents—without engaging with Google’s explanation of *why* that language is of no import. *Compare* Memo. 9 with Opp. 8-9. The only way that disclosure of shared circuitry could undermine Google’s argument, which is based on the meaning of the word “unit,” is if two physical *units* shared circuitry. But as explained before (Memo. 9), and as Singular does not deny, the written description only describes “*functions*” that “share circuitry.” Opp. 8 (quoting from ’273 patent at 13:39-54) (emphasis in original). Those functions are implemented in a “single” adder/subtractor, *id.*, one that is treated as a distinct unit, *see* Memo. 9 (reproducing figure 6 in the ’273 patent). Thus, the written description supports Google’s argument, and Singular offers no meaningful rebuttal.

Beyond that, Singular ignores the extensive evidence from the specification showing that all “units” represent distinct circuitry. *See* Memo. 8-11. Singular repeatedly accuses Google of relying on these embodiments to import a limitation into the claim language (e.g., Opp. 8, 9-10, 12), but that argument misses the point. Google points to these disclosures only to show that the word “unit” is used in its ordinary way throughout the patents. There is nothing improper about such reasoning. *E.g., Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001) (after identifying a term’s “plain meaning,” the “next step” in construing that term is “to confirm that the patentee’s use of the disputed terms is consistent with the meaning given to it by the court.”). The claims are limited to non-overlapping execution units because that follows from the plain meaning of the word “unit.”

(2) The exceeds limitation, which Singular has described as the “key” invention in its patents, lends further support to Google’s proposed construction. *See* Memo. 12-15. There is no

principled basis for identifying and counting execution units that may overlap, and Singular’s argument to the contrary conflicts with its own prior statements.

The “principled basis” Singular offers for counting execution units amounts to counting LPHDR *operations*, not circuitry. *See* Opp. 10. Singular claims that LPHDR execution units are “adapted to execute *reduced-precision* operations,” so “one can” simply “count the number of reduced precision outputs.” *Id.* Then, it points to a Google document that discusses how many operations the accused products “execute” within one “clock cycle.” Opp. 10 (brackets omitted). There can be no question that Singular is now advocating for counting the number of operations to assess infringement.<sup>1</sup>

But Singular cannot, and does not even attempt to, square this argument with its prior representations. Singular has unequivocally argued that its expert “does not count LPHDR operations.” Dkt. 505 at 10 (Opposition to Summary Judgment). In Singular’s own words, “[t]here is no dispute that LPHDR execution units are distinct from the LPHDR operations they perform.” *Id.* at 12. Yet Singular now relies on counting *operations* to assess infringement.

Nor can Singular square its argument with the Court’s prior claim-construction order. The claimed execution units are “tangible” hardware in an apparatus claim. *See* Dkt. 354 at 22 (construing “execution unit”). Thus, infringement must be shown based on what an accused “device is, not what [that] device does.” *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d

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<sup>1</sup> To the extent Singular argues that one LPHDR execution unit must produce no more than one output (*cf.* Opp. 7, 10) based on the “a first operation” language, that argument contradicts a host of basic claim-construction principles. *E.g.*, *AFG Indus. Inc. v. Cardinal IG Co., Inc.*, 239 F.3d 1239, 1244-45 (Fed. Cir. 2001) (“When a claim uses an ‘open’ transition phrase, its scope may cover devices that employ additional, unrecited elements.”); *01 Communique Lab’y, Inc. v. LogMeIn, Inc.*, 687 F.3d 1292, 1297 (Fed. Cir. 2012) (holding that “a” means “one or more” in a patent claim, absent “extremely limited” circumstances). It would also conflict with Singular’s infringement theory—which relies on the same hardware (i.e., each rounder) to produce **128** outputs.

1464, 1468 (Fed. Cir. 1990). Singular cannot point to LPHDR operations to show infringement. *See* Memo. 14. Its attempt to do so now is gamesmanship the Court should reject.

(3) The asserted patents recite claims that require “locally connected” execution units, and under clear precedent, this requires those units to be distinct components. Memo. 15-16. Singular can oppose this point only by ignoring binding precedent and bedrock principles of claim construction. *See* Opp. 11.

Singular characterizes Google’s view of “connections” as “myopic,” but fails to engage with the binding precedent Google relied upon. *Compare* Opp. 11 *with* Memo. 15. Claim 19 requires at least two execution units that are “locally connected” to one another. If these two execution units could overlap, each unit would have to be connected to itself—a “physical impossibility.” *See Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1255 (Fed. Cir. 2010); *Barrday, Inc. v. Lincoln Fabrics, Inc.*, No. 22-1903, 2023 WL 7871688, at \*4 (Fed. Cir. Nov. 16, 2023). In response, Singular suggests only that the ***non-overlapping*** portions of those execution units could be connected, with no support in the specification for that novel view. Moreover, as explained (Memo. 16), a skilled artisan could not discern whether overlapping units are “locally connected.” In a sense, the mere existence of overlap makes those units “locally connected.” And Singular makes no attempt to engage with that point in a meaningful way.

Otherwise, Singular invites the Court to violate bedrock principles of claim construction. It suggests that “the *asserted* claims” do not contain the locally connected limitation, so that limitation cannot be used to construe those claims. Opp. 11. But it is black-letter law that claim construction considers both asserted and unasserted claims. *Evolution Concepts, Inc. v. HOC Events, Inc.*, 22 F.4th 1361, 1365 (Fed. Cir. 2022). This follows from the “strong” principle that “the same phrase in different claims” should have the “same meaning.” *See id.* (quoting *In re*

*Varma*, 816 F.3d 1352, 1363 (Fed. Cir. 2016)). Singular has identified no reason why that principle should not apply here, nor does it identify anything in the specification that would justify treating claim 19 differently from the asserted claims.

(4) Finally, Dr. Bates has claimed a key feature of his “invention” is “massively parallel” hardware. Memo. 16-17. In so doing, he recognized that execution-unit hardware—like parallel lines—must not intersect. Again, Singular’s response is a non sequitur.

Singular primarily argues the asserted claims do not require a “parallel” computing device. *See* Opp. 12 (“Critically, there is *no such limitation* in the asserted claims.”). But this ignores the “exceeds” limitation, which requires at least 100 more LPHDR execution units than 32-bit units, and Singular’s representations about the asserted “invention” being tied to that limitation. Binding caselaw prevents Singular from escaping those representations. *E.g., Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021, 1024-25 (Fed. Cir. 2015) (holding that statements about the “present invention” bind a patentee and collecting cases).

Singular’s only other argument, relegated to a footnote, is that Dr. Bates’s statements about “massively parallel” devices ought to be limited to devices that are configured to execute massively parallel operations. Opp. 11-12 n.3. That argument, built entirely upon extrinsic evidence, ignores Dr. Bates’s assertions regarding the importance of parallel hardware. *See* Memo. 16. Singular does not engage with, or otherwise explain, those representations.

### **C. Extrinsic Evidence Supports Construing “Unit” as Requiring Non-Overlapping Components**

The extrinsic evidence reinforces the conclusion that one claimed “execution unit” cannot overlap with another. As a preliminary matter, Singular does not dispute the extrinsic evidence Google identified previously, Memo. 17-18, so that evidence remains unrebutted. In addition, the

weight of the new evidence Singular cites (*see* Opp. 6-7, 13-14) actually supports Google’s position.

A host of Singular’s proposed definitions for “unit” show that the word excludes overlapping components. One dictionary defines a “unit” as “a single thing ... that is ***complete by itself***,” Dkt. 597-6 at 2 (emphasis added). Another defines a “unit” as “any group of things ... regarded as an ***entity***” or “a magnitude regarded as an ***independent*** whole; a single, indivisible ***entity***”—evoking the same completeness idea. Dkt. 597-4 at 3 (emphasis added); *see also* Dkt. 597-4 at 2 (“a single undivided entity or whole”). Two other dictionaries define a “unit” as “a ***distinct*** entity” or “a single” thing “as ***distinguished*** from others[.]” Dkt. 597-7 at 2 (emphasis altered). These definitions bear a striking resemblance to Google’s account of the plain meaning of “unit,” as supported by its ordinary usage. Memo. 7-8. These definitions, combined with the intrinsic evidence, provide strong support for Google’s construction.

The definitions of “execution unit” are similar. Wikipedia describes an execution unit as having “its own ***internal***” units. Dkt. 597-8 at 2; Dkt. 597-9 at 2. This would make no sense if execution units could overlap: because the boundaries of a “unit” would be indeterminate, there would be no way to know what is “internal” to any given unit. In addition, the Cambridge Dictionary includes an example sentence in which “[e]ach processing element” generates an output that is “transmitted to” another “processing element.” Dkt. 597-11 at 2. Like the connected-to limitation (*see supra*, pp. 7-8), transmitting outputs from one unit to another makes sense only if the units are distinct.

Finally, Singular’s reliance on one of Google’s patent applications is both irrelevant and unintelligible. It is a “well-understood notion that claims of unrelated patents must be construed separately.” *e.Digital Corp. v. Futurewei Techs., Inc.*, 772 F.3d 723, 727 (Fed. Cir. 2014).

Singular has provided no persuasive reason for departing from that rule. Indeed, Singular’s argument is indecipherable. It cites to and quotes from line numbers, *see* Opp. 13, despite only including a patent *application* as an exhibit, which contains no such line numbers and none of the quoted language. *See* Dkt. 597-17. The attached exhibit does contain the block quote on page 14 of the Response, along with the excerpted figure, but both support Google’s interpretation. The figure shows a number of units, none of which overlaps. Dkt. 597-17 at ECF 5.

#### **D. Google’s Construction is Consistent with Its Invalidity Theories**

In a final attempt to undermine Google’s construction, Singular points to the expert report of Dr. Miriam Leaser. Opp. 12-13. But Dr. Leaser’s report is irrelevant to the question of claim construction—being neither intrinsic nor extrinsic evidence—and is entirely consistent with Google’s proposed constructions.

As explained (*see* Memo. 11), a set of nonoverlapping “units” may still be connected to some other shared structure. Every apartment on a floor is connected to a shared hallway, and every washer/dryer unit in a laundry is connected to a shared power source. But this does not make the “apartment units” or “washer/dryer units” overlapping structures (and Singular does not argue that they are).

In the same way, Dr. Leaser opined, consistent with Google’s proposed construction, that an “SRAM” “is accessible” to a number of execution units over a bus. *See* Dkt. 597-16 at 151:13-17. She makes this crystal clear in her report: “it is my opinion that a C2 multiplier constituted the claimed ‘execution unit,’” Dkt. 494-4 ¶ 160, and each of those multipliers “has direct access” to shared memory, *id.* ¶ 164. Although they share memory, each “unit” remains physically distinct. That is, the C2 multipliers are like the “apartment units” on a floor and the memory is like the hallway on that floor. In all events, Dr. Leaser’s opinion does not change the intrinsic or extrinsic records—both of which support Google’s construction.

### III. CONCLUSION

The Court should clarify that the claimed execution units cannot overlap, construing the claimed “execution unit” to mean a “*physically distinct* processing element comprising an arithmetic circuit paired with a memory circuit.” (emphasis on language added to prior construction, *see* Dkt. 354).

Respectfully submitted,

Dated: November 20, 2023

By: /s/ Nathan R. Speed

Gregory F. Corbett (BBO #646394)  
gcorbett@wolfgreenfield.com  
Nathan R. Speed (BBO #670249)  
nspeed@wolfgreenfield.com  
Elizabeth A. DiMarco (BBO #681921)  
edimarco@wolfgreenfield.com  
Anant K. Saraswat (BBO #676048)  
asaraswat@wolfgreenfield.com  
WOLF, GREENFIELD & SACKS, P.C.  
600 Atlantic Avenue  
Boston, MA 02210  
Telephone: (617) 646-8000  
Fax: (617) 646-8646

Robert Van Nest (admitted *pro hac vice*)  
rvannest@keker.com  
Michelle Ybarra (admitted *pro hac vice*)  
mybarra@keker.com  
Andrew Bruns (admitted *pro hac vice*)  
abruns@keker.com  
Vishesh Narayen (admitted *pro hac vice*)  
vnarayen@keker.com  
Christopher S. Sun (admitted *pro hac vice*)  
csun@keker.com  
Anna Porto (admitted *pro hac vice*)  
aporto@keker.com  
Deeva Shah (admitted *pro hac vice*)  
dshah@keker.com  
Stephanie J. Goldberg (admitted *pro hac vice*)  
sgoldberg@keker.com  
Eugene M. Paige (admitted *pro hac vice*)  
epaige@keker.com  
Rachael E. Meny (admitted *pro hac vice*)

rmeny@keker.com  
Eric K. Phung (admitted *pro hac vice*)  
ephung@keker.com  
Kaiyi A. Xie (admitted *pro hac vice*)  
kxie@keker.com  
KEKER, VAN NEST & PETERS LLP  
633 Battery Street  
San Francisco, CA 94111-1809  
Telephone: (415) 391-5400

Michael S. Kwun (admitted *pro hac vice*)  
mkwun@kblfirm.com  
Asim M. Bhansali (admitted *pro hac vice*)  
abhansali@kblfirm.com  
KWUN BHANSALI LAZARUS LLP  
555 Montgomery Street, Suite 750  
San Francisco, CA 94111  
Telephone: (415) 630-2350

Matthias A. Kamber (admitted *pro hac vice*)  
matthiaskamber@paulhastings.com  
PAUL HASTINGS LLP  
101 California Street, 48<sup>th</sup> Floor  
San Francisco, CA 94111  
Telephone: (415) 856-7000  
Fax: (415) 856-7100

Ginger D. Anders (admitted *pro hac vice*)  
Ginger.Anders@mto.com  
J. Kain Day (admitted *pro hac vice*)  
Kain.Day@mto.com  
MUNGER, TOLLES & OLSON LLP  
601 Massachusetts Avenue NW, Suite 500E  
Washington, D.C. 20001  
Tel: (202) 220-1100

Jordan D. Segall (admitted *pro hac vice*)  
Jordan.Segall@mto.com  
MUNGER, TOLLES & OLSON LLP  
350 South Grand Avenue, 50th Floor  
Los Angeles, CA 90071-3426  
Tel: (213) 683-9100

*Counsel for Defendant Google LLC*



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Nathan R. Speed